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(54) **LOW FIELD MOBILITY SEPARATION OF IONS USING SEGMENTED CYLINDRICAL FAIMS**

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(52) **U.S. Cl.** ..... **250/282; 250/281; 250/290**

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See application file for complete search history.

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(57) **ABSTRACT**

A method of separating ions is disclosed. The method includes a step of providing a FAIMS analyzer region for separating ions, the FAIMS analyzer region including at least one region of segmentation. The segmentation permits ion trapping, and a combination trapping and gating that permits high efficiency of ions collection from continuous ion sources. The ions are separated in segmented FAIMS, according to their high-field mobility properties, and by using the method described herein according to their low-field mobility. The ions are separated by low field mobility using stationary potential gradients formed by voltages applied to the segments, and by traveling potential gradients of various shapes. The ions are separated along the longitudinal direction in cylindrical FAIMS, and may be detected in a time-of-arrival fashion as the ions leave the ion outlet of FAIMS or optionally the ions other than selected are caused to collide with the electrodes and only the selected ions transmitted. This is a high resolution separation, combining the ion properties at high-field, as well as the low-field mobility properties, for selection of specific ions from very complex mixtures.

**31 Claims, 27 Drawing Sheets**

